METHOD AND SYSTEM FOR DETECTING RADIATION INCORPORATING A HARDENED PHOTOCATHODE

ABSTRACT OF THE DISCLOSURE

A method for detecting radiation is disclosed. The method comprises nine steps. Step one calls for forming a detector having a photocathode (22) with a protective layer (22c) of cesium, oxygen and fluorine; a microchannel plate (MCP) (24); and an electron receiver (26). Step two requires receiving radiation at the photocathode (22). Step three provides for the photocathode (22) discharging electrons (34) in response to the received photons. In step four, the method provides for accelerating discharged electrons (34) from the photocathode (22) to the input face (24a) of the microchannel plate (24). The next step calls for receiving the electrons (34) at the input face (24a) of the microchannel plate (24). Step six calls for generating a cascade of secondary emission electrons (36) in the microchannel plate (24) in response to the received electrons (34). The seventh step calls for emitting the secondary emission electrons (36) from the output face (24b) of the microchannel plate (24). In the eighth step, the method provides for receiving secondary emission electrons (36) at the electron receiver (26). The last step calls for producing an output characteristic of the secondary emission electrons (36).

A device for detecting radiation is disclosed. The device comprises a photocathode (22), a microchannel

plate (24) and an electron receiver (26). The photocathode (22) is operable to receive radiation on an input side (22a) and to discharge electrons (34) from its output side (22b) in response. The output side (22b) of the photocathode (22) has a protective layer (22c) comprising cesium, oxygen and fluorine. The microchannel plate (24) serves to receive electrons (34) on its input face (24a) from the photocathode (22), to produce a cascade of secondary emission electrons (36) and to discharge those electrons (36) from its output face (24b). The electron receiver (26) is operable to receive secondary emissions electrons (36) from the microchannel plate (24) and to produce an output characteristic of those electrons (36).

A method for manufacturing a hardened photocathode (22) is disclosed. The method comprises four steps. The first step requires forming a photocathode (22) having an input side (22a) for receiving radiation and an output side (22b) for discharging electrons. The second through fourth steps require exposing the output side of the photocathode (22b) to cesium, oxygen and fluorine respectively to form a protective layer (22c).